

REMARKS

Applicants assume that Examiner's use of the term "gas generant" (which does not appear in the claims) is referring to the solid fuel component of the claimed mixture. Applicants' election is being made based on that assumption. In the event the Examiner meant otherwise, Examiner is respectfully requested to clarify the requirement, with specificity. Applicants hereby elect nitroguanidine as the solid fuel component. Further, Applicants hereby elect a powder shape for the solid fuel component. Claims 1-5, 10, 12-16 are generic. Claims 8-9 and 11 read on the elected species. Examination on the merits of elected claims 1-5 and 8-16 is respectfully requested.

The specification is also amended herein to clarify terminology. During prosecution of the parent application, it was suggested that the term nitrogen monoxide, as used in the first paragraph on Page 3 for example, is equivalent to dinitrogen monoxide, also known as laughing gas, nitrous oxide or N_2O , according to Hawley's Chemical Dictionary. However, the Merck Index equates the term nitrogen monoxide to mononitrogen monoxide, also known as nitric oxide or NO. Relevant excerpts from the Merck Index are submitted herewith. In the first paragraph on Page 3, amended herein for clarification, the critical temperatures and pressures were originally given for the two components, which as stated can be used together in a mixture, and comparing these values to the values provided for nitric oxide (NO) and nitrous oxide (N_2O) in the Merck Index, it is clear that these two different components were intended. Thus, the combination of NO and N_2O is fully supported by the specification, and the specification is amended for clarification consistent with the Merck Index in a manner that presents no new matter.

Claims 9 and 10 are also amended herein to insert commas omitted from the listing of elements in a manner consistent with the specification, such that no new matter is presented.

Application Serial No. 10/807,289
Response dated November 16, 2006
Reply to Office Action of October 17, 2006

An Action on the merits for claims 1-5 and 8-16 is respectfully requested.

Respectfully submitted,

WOOD, HERRON & EVANS LLP.

By: /Kristi L. Davidson/
Kristi L. Davidson, Reg. No. 44,643

2700 Carew Tower
441 Vine Street
Cincinnati, OH 45202
513/241-2324 (voice)
513/241-6234 (facsimile)
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THE MERCK INDEX

AN ENCYCLOPEDIA OF
CHEMICALS, DRUGS, AND BIOLOGICALS

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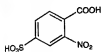
Page 1131

Org. Syn. coll.

Chlorocyclohexane, fan-shaped crystals. Sol in ~40 parts more sol in hot water; slightly sol in methyl or ethyl alcohol.

Use: As reagent for cobalt and potassium.

6743. 2-Nitro-4-sulfobenzoic Acid. $C_6H_4NO_5S$; mol wt 201.16. C 34.01%, H 2.04%, N 5.67%, O 45.31%, S 12.97%. Prep by sulfonation of *o*-nitrotoluene and oxidation of the resulting 2-nitro-4-toluenesulfonic acid with potassium permanganate. *Harl. Am. Chem. J.* **1**, 352 (1879-80).



Na-salts from hydrochloric acid. Stable in air under ordinary conditions.

Use: Alkalimetric standard.

6744. Nitrofluoride. $CINO_2$; mol wt 65.46. Cl 41.9%, N 21.40%, O 24.44%. NOCl. Best prepared from nitrosulfuric acid and dry HCl. *Coleman et al., Inorg. Chem.* **1**, 52 (1959).

Non-explosive, very corrosive, reddish-yellow gas; liquid at -35° ; solid at -61.5° . Decomposed by water. Sol in fuming H_2SO_4 . Critical temp 167° ; crit press. 92.4 atm. The deep color of aqua regia is produced by nitrosyl chloride.

Caution: Intensely irritating to eyes, skin, mucous membranes. Inhalation may cause pulmonary edema, hemorrhage.

6745. Nitrosyl Fluoride. Nitrogen oxyfluoride. FNO ; mol wt 49.00. F 38.77%, N 28.58%, O 32.65%. Preparation: *Ruff et al., Z. Anorg. Allgem. Chem.* **208**, 295 (1932); *de Maillet, ibid.* **217**, 166 (1934); *Falcon, Kenna, J. Am. Chem. Soc.* **73**, 2937 (1951); *Kwasnik in Handbook of Inorganic Chemistry* (vol. 1, G. Brauer, Ed., Academic Press, New York, 2nd ed., 1963) pp 184-185. *Kennedy, Hoffman, Neville, Chem. Rev.* **62**, 1-18 (1962); *Leahy, Sharp, Advan. Fluorine Chem.* **4**, 194-195 (1965); *Wolf, ibid.* **5**, 1-30 (1965); *Schmutzler, Angew. Chem. Int. Ed.* **4**, 440-455 (1965).

Colorless gas. Often bluish because of impurities. Vigorous reaction with glass, corroding action on quartz. May be kept in quartz ampuls if cooled in liq oxygen. mp -132.5° ; bp -59.5° ; d (liq at bp) 1.326, d (solid) 1.719. Trouton const. 21.3. Reacts with water to form NO , HNO_2 and HF . Caution: Highly irritating to skin, eyes, mucous membranes. See also Fluorine.

Use: Oxidizer in rocket propellants; stabilizing agent for SO_2 ; fluorinating agent.

6746. Nitrosylsulfuric Acid. Sulfuric acid mononitrosyl; nitrosyl acid; nitrosyl sulfate; chamber crystals: $H_2SO_4 \cdot HNO_2$; mol wt 127.08. H 7.79%, N 11.02%, O 62.95%. S 12.26%. Formed as an intermediate in the lead chamber process for sulfuric acid by the reaction of sulfur dioxide, nitrogen trioxide, oxygen, and water. *Clément, Desormes, Compt. Rend. Acad. Sci. Paris [1]* **59**, 329 (1806); *Lunge, J. Chem. Soc. (A)* **1885** (1885). Prep from sulfur trioxide, nitrogen oxides, and water. *DeBrenner, Schweiger's Journ.* **8**, 239 (1812); *Leahy, Ann. Chem. Phys.* [2] **45**, 284 (1832); *Kahlbaum, ibid.* [3] **1**, 116 (1843); from silver acid sulfate and hydrosulfuric acid. *Berl et al., Z. Anorg. Allgem. Chem.* **209**, 295 (1932). See also U.S. pats. 1,909,587 and 1,909,558.

Reaction of crystals of nitrosylsulfuric acid may be reversed by igniting a mixture of 1 part sulfuric and 2 or 3 parts potassium nitrate under a bell jar.



mp dec 73.5° . In moist air the crystals dec with the evolution of sulfuric and nitric acids and above 50° nitric

oxide and nitrogen dioxide are evolved. Sol in sulfuric acid, dec in water.

Use: For bleaching cereal milling products.

6747. Nitrosyl Tetrafluoroborate. Nitrosonium tetrafluoroborate; nitrosyl borofluoride; nitrosyl fluoroborate. BF_3NO ; mol wt 116.81. B 9.26%, F 65.06%, N 11.99%, O 13.70%. NOBF₃. Prep according to the equation: $2 HBF_4 + N_2O \rightarrow 2 NOBF_3 + H_2O$. *Wilke-Dörfler, Balz, Z. Anorg. Allgem. Chem.* **159**, 219 (1927); *Balz, Mailänder, ibid.* **217**, 162 (1934); *H. S. Booth, D. R. Martin, Boron Trifluoride and Its Derivatives* (New York, 1949) p 133. Review of tetrafluoroborates: *Sharp, Advan. Fluorine Chem.* **1**, 68-128 (1960).

Birefringent, orthorhombic, hygroscopic platelets. d_4^{25} 1.285. Sublimes at 0.01 mm and 250° without decomp. Decomposed by water. May be stored in glass bottles if absolutely dry.

Use: In the prep of diazonium fluoroborates.

6748. Nitrotoluene. Methylnitrobenzene. $C_7H_7NO_2$; mol wt 137.14. C 61.31%, H 5.14%, N 10.21%, O 23.33%. Nitration of toluol by a mixture of HNO_3 and H_2SO_4 yields principally *o*- and *p*-nitrotoluol.

Decomposed by 3-nitro-4-amino-toluene and $NaNO_2$. *Clark, Taylor, Org. Syn.* **3**, 91 (1923).



m-Nitrotoluene. Liquid. d_4^{25} 1.1630; d_4^{20} 1.1581; d_4^{15} 1.124; d_4^{10} 1.063. Solidifies in an ice and salt cooling mixture; melts at 15.5° . bp_{760} 231.9; bp_{10} 156.9; $bp_{0.5}$ 150.7; $bp_{0.1}$ 132.8; $bp_{0.05}$ 126.0; $bp_{0.01}$ 107.0; $bp_{0.005}$ 102.2; $bp_{0.001}$ 94.6. Absorption spectrum: *Marchlewski, Mayer, Bull. Acad. Polon. [A]* **1929**, 188. Soly in water at 30° : 0.498 g/l. Miscible with alcohol and ether. Sol in benzene.

o-Nitrotoluene. Yellowish liquid at ordinary temp. d_4^{25} 1.1622; mp -10° ; bp 222° ; n_D^{20} 1.5472. Almost insol in water; sol in alcohol, benzene, petr ether.

p-Nitrotoluene. Yellowish crystals. d 1.286. mp 53.54° ; bp 238° . Flash pt 106° . Almost insol in water; sol in alcohol, benzene, ether, chloroform, acetone.

Use: Manuf of dyes, toluidines, nitrobenzoic acids, etc.

6749. Nitrourea. *N*-Nitrocarbamide. $CH_3N_3O_2$; mol wt 105.05. C 11.43%, H 2.88%, N 40.00%, O 45.69%. $NH_2CONHNO_2$. Prep by the action of condensed sulfuric acid upon urea nitrate: *Thiele, Lachman, Ann. Chem.* **288**, 281 (1895); *Ingersoll, Armendt, Org. Syn.* **5**, 85 (1925). By dropwise addition of HCl to a cooled mixture of silver cyanate and nitramide in water: *Davis, Blanchard, J. Am. Chem. Soc.* **51**, 1794 (1929).

Platelets from alcohol + petr ether dec 158.4 and 158.8° . K at $20^\circ = 7.0 \times 10^{-3}$. Absorption spectrum: *Baly, Desch, J. Chem. Soc.* **93**, 1753 (1908). Soluble in hot water, but water solns are unstable. Decomps in aq alkaline solns is almost instantaneous. Freely sol in acetone, alcohol, acetic acid. Sparingly sol in petr ether, chloroform, benzene. Stable to oxidizing agents. Can be detonated, but is not sensitive to percussion or heating.

6750. Nitrous Acid. HNO_2 ; mol wt 47.01. H 2.14%, N 29.79%, O 68.06%. Formed by the action of strong acids on inorganic nitrites. *Review: Block, "Nitrous Acid, Hyponitrous Acid and their Salts" in Mellor's Vol. VIII, supplement II, Nitrogen* (part 2) 253-408 (1967).

Known only in soln (pale blue in color). Weak acid. K (25°): 4.5×10^{-4} . In water it changes quickly into nitric oxide and nitric acid. Forms stable, water-sol nitrites with Li, Na, K, Ca, Sr, Ba, Ag. Does not form salts with weak polyvalent cations like Al or Be. Forms stable esters with alcohols.

6751. Nitrous Oxide. Dinitrogen monoxide; laughing gas; hyponitrous acid anhydride; facititious air. N_2O ; mol wt 44.01. N 63.65%, O 36.35%. Constituent of the earth's atm. about 0.00005% by volume: *Slobod, Krogh, J. Am.*

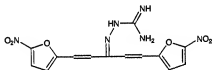
Chem. Soc. Sci. 72, 175 (1950). Prepared by thermal decompn of ammonium nitrate. E. H. Archibald, *The Preparation of Pure Inorganic Substances* (Wiley, New York, 1932) p 246; Castner, *Kirst. U.S. pat.* 2,111,276 (1938 to du Pont). Preparation and purification: Schenk in *Handbook of Preparative Inorganic Chemistry*, 2nd ed. (Academic Press, New York, 2nd ed., 1963) pp 484-485. The chief impurity of the commercial product is N_2 , although NO_2 , N_2O , and CO_2 may also be present. Teratogenicity study: G. A. Lane et al., *Science* 210, 899 (1980). Reviews: Beattie, "Nitrous Oxide" in *Mellor's Vol. VIII*, suppl II, Nitrogen (part 2) 89-215 (1967); Jones, in *Comprehensive Inorganic Chemistry*, Vol. 3, 1-10 (1973); Jones, et al., Eds. (Pergamon Press, Oxford, 1973) pp 316-373.

taste. Supports combustion. Very stable and rather inert at room temperature. Dissociation begins above 300° when the gas becomes a strong oxidizing agent. *Re. Nat. Bur. Stand.* 24, 381 (1945). Dipole moment, 0.166, d^{-1} (lig) 1.226, $d(S.T.P.)$ 1.967; $d(gas)$ 1.53 (air = 1). Critical temp 36.8°; crit press 71.2 atm. Heat of vaporization (20°): 3.95 kcal/mol. *Re. Nat. Bur. Stand.* 24, 381 (1945). The form of gas over liquid and has a pressure of ~800 lbs/sq in. at room temp. At 20° and 2 atm one liter of the gas dissolves in 1.5 liters of water. Freely sol in sulfuric acid. Sol in alcohol, ether, oils. *Caution:* Causes severe eye irritation. High concentrations cause severe eye irritation. *Re. Nat. Bur. Stand.* 24, 381 (1945).

USE: To oxidize organic compds at temps $> 300^\circ$; to make nitrites from alkali metals at their boiling points; in rocket fuel formulations (with carbon disulfide); in the prepn of whipped cream.

THERAP CAT: Anesthetic (inhalation); analgesic.

6752. Nitrovin, 2-(3-(5-Nitro-2-furyl)-2-furyl)-1-[2-(5-Nitro-2-furyl)ethyl]vinyl-2-propenylidenehydrazinecarboximidamide; [3-(5-Nitro-2-furyl)-1-[2-(5-Nitro-2-furyl)vinyl]dellidylamino]guanidine; sym-bis(5-nitro-2-furyl)vinylideneacetone guanyldiazazone; 1,5-bis(5-nitro-2-furyl)-3-pentadienone guanyldiazazone; 1,5-bis(5-nitro-2-furyl)-3-pentadienone amidinodiazazone; Panazon; Payzone. $C_{14}H_{10}N_6O_6$, mol wt 360.29. C 46.67%, H 3.36%, N 26.64%. Free base. mp 120–121°C (decolor). d_4^{25} 1.52(2) (to 20°C). n_D^{25} 1.48, 1115b (1954); Ueda, Tanizaki, Japan. pat. 44796 (94) (to Fokusu Pharm.). C. 62, 10412f (1965).



Blackish violet crystals from ethyl alcohol, mp 217° (dec).

Hydrochloride, mp 280° (dec).

THERAP CAT (VET): Growth promoter; antibacterial.

6753. Nitroxlone, 5-Nitro-8-quinolinol; 5-nitro-8-hydroxyquinoline. Enterococ; Nisibiol; Nisobiol; Uontrol; Urocoli. $C_{12}H_9N_3O_3$; mol wt 190.16. C 56.58%; H 3.18%; N 14.73%. 25.24%. Prep: Kostaneber, Ber 24, 154 (1891); Petrow, Sturgeon, *J. Pharm. Med.* 11, 116 (1896). In vitro antibacterial and antifungal activity: A. Designes, P. Leguen, *Ann. Pharm. Franc.* 21, 803 (1963); M. Medic-Saric et al., *Chemotherapy* 26, 263 (1980). Toxicological study: O. Angelova et al., *Adv. Antimicrob. Antiparasitic Chem.* 1, 111 (1978). *In vivo* studies: A. Mhrar et al., *Int. J. Clin. Pharmacol. Biopharm.* 17, 476 (1979). HPLC determ in plasma and urine: R. H. A. Sorel et al., *J. Chromatog.* 222, 241 (1981). Clinical evaluation in urinary tract infections: M. R. Jacobs et al., *Am. J. Med.* 65, 872 (1978). B. Caneet, A. Amgar, *Pathol. Lab. Med.* 55, 872 (1978).



Yellow needles from alcohol or acetic acid, mp 179.5-181.5°. Freely sol in alkali and hot HCl; sparingly sol in alcohol, ether.

Hydrochloride, $C_9H_7ClN_2O_3$, yellow needles from alcohol, mp 258°.

THERAP CAT: Antibacterial.

6754. Nitroxynil. 4-Hydroxy-3-iodo-5-nitrobenzonitrile; Dovenix. $C_7H_3IN_2O_3$; mol wt 290.02. C 28.99%, H 1.04%, I 43.76%, N 9.66%, O 16.55%. Preparation: Neth. pat. Appl. 6,516,359 corresp to Collins *et al.*, U.S. pat. 3,331,738 (1966, 1967 both to May & Baker).



Yellow crystals from benzene, mp 137-138°. Sparingly sol in water; moderately sol in most organic solvents.

D-N-Methylglucamine salt, $C_{14}H_{26}(N_2O_6)$, nitroxynil methylamine, 4-hydroxy-3-iodo-5-nitrobenzonitrile compd with D-1-deoxy-1-(methylamino)glucitol (1:1). Solid, mp 85-90°.

N-Ethylglucamine, $C_8H_{19}N_2O_5$, nitroxylin, nitroxylin, 4-hydroxy-3-iodo-5-nitrobenzonitrile compd with 1-deoxy-1-(ethylamino)glucitol (1:1), *Trodax*. Readily sol in water with a yellow, odorless and substantially neutral soln. Aq soln is very stable but contamination with calcium and certain other salts can result in pptn of an insol salt of nitroxylin.

THERAP CAT (VET): Anthelmintic (fasciolicide).

6755. Nitryl Chloride. Nitroxyl chloride. ClNO_2 ; mol. wt 81.46. Cl 43.52%, N 17.19%, O 39.28%. NO_2Cl . Conveniently prepd by the addn of chlorosulfonic acid to nitric acid: Dachlauer, Ger. pat. 509,405 (1929 to I. G. Farben); Kaplan, Schechter, *Inorg. Syn.* 4, 52 (1953); Collis *et al.*, *J. Chem. Soc.* 1958, 438.

Corrosive, toxic, colorless gas. Chlorine-like odor. Vapor density (100°): 2.81 g/l. Dec $>120^\circ$. bp -14.3° mp -145° . d_{40}^{20} 1.37; d_{40}^{25} 1.33. Even the purest liquid may have a pale yellow color. Solns in polar solvents are always yellow. The gas or liquid may attack organic matter with explosive violence.

Caution: Strong irritant, corrosive.

USE: Nitrating and chlorinating agent in organic synthesis.

6756. Nitryl Fluoride. FNO₂; mol wt 65.00. *Prep.* Credit for original prep. by the spontaneous combustion of nitric oxide in an atmosphere of fluorine. *Properties.* Nitryl fluoride is a colorless gas; the boiling point is 29.23°C, *n*_D²⁰ 1.21555, *d*₄²⁰ 0.49233. The spontaneous combustion of nitric oxide in an atmosphere of fluorine is given to Moissan, Lebeau, *Compt. Rend. Acad. Sci. Paris*, 1873, 1861 (1905); more recently prepared by the reaction of nitric oxide and fluorine, *Chem. Ber.*, 1898, 1932; ¹Aloun, Kenna, *J. Am. Chem. Soc.*, 73, 2317 (1951). Reviews of prep and chemistry: Hoffmann, *Nitrogen Compounds*, 1951; *Chem. Rev.*, 62, 1-18 (1962); Kwasnick in *Handbook of Fluorine Chemistry*, 2nd ed. (Comparative Inorganic Chemistry vol. 1, G. Brauer, Ed.), Springer-Verlag, New York, 1963, pp. 155-187 (1965); ²Edwards, *Chem. Rev.*, 45, 195-196 (1965); ³Edwards, *Advances in Fluorine Chemistry*, 4, 1-15 (1968); ⁴Edwards, *Chem. Rev.*, 47, 440-455 (1968).

Colorless gas. Pungent odor. Attacks mucous membranes. mp -166.0° . bp -72.4° . d (liq at bp) 1.796. d (solid) 1.924. Trouton const 21.2. May be stored in quartz ampuls if cooled in liq oxygen. Purification can be accomplished by fractional distillation at reduced press. in dry

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Crystals, ethanol). u in water; sol g/10 g (Ta Caution: fever, naus; sepsis; necr horn, D. G. Treatment o pp. 1312-13

6758. *N*-[4-*ethoxyethyl*]phenylamine; *N*-[4-*ethyl-2-thiazolyl*]-2-thiazolamine; 2E-101; Z1 Gastrax; Na mol wt 331.19, 35%. His-
dine, g.k. Pr U.S. pat. 4,3 pharmacol. Forch. 39, 2 suppression
muscol. Ther. metabolism
Pharmacol. 2 Hamann: M. (1966). Syrr Scand. J. Ga
prehensive di of Drug Subs New York.

Crystals from (methanol): mp 118-119°C (decolor); n_D^{20} 1.4820, n_D^{25} 1.4790; d_4^{20} 1.0300; d_4^{25} 1.0270; η_{inh}^{25} 0.35; IR (KBr): 1715 (C=O), 1600 (C=C), 1510 (C=C), 1450 (C=C), 1380 (C=C), 1320 (C=C), 1280 (C=C), 1240 (C=C), 1180 (C=C), 1140 (C=C), 1100 (C=C), 1060 (C=C), 1020 (C=C), 980 (C=C), 940 (C=C), 900 (C=C), 860 (C=C), 820 (C=C), 780 (C=C), 740 (C=C), 700 (C=C), 660 (C=C), 620 (C=C), 580 (C=C), 540 (C=C), 500 (C=C), 460 (C=C), 420 (C=C), 380 (C=C), 340 (C=C), 300 (C=C), 260 (C=C), 220 (C=C), 180 (C=C), 140 (C=C), 100 (C=C), 60 (C=C); 1H NMR (CDCl₃): δ 7.2-7.4 (m, 1H), 6.8-7.0 (m, 1H), 6.4-6.6 (m, 1H), 6.0-6.2 (m, 1H), 5.6-5.8 (m, 1H), 5.2-5.4 (m, 1H), 4.8-5.0 (m, 1H), 4.4-4.6 (m, 1H), 4.0-4.2 (m, 1H), 3.6-3.8 (m, 1H), 3.2-3.4 (m, 1H), 2.8-3.0 (m, 1H), 2.4-2.6 (m, 1H), 2.0-2.2 (m, 1H), 1.6-1.8 (m, 1H), 1.2-1.4 (m, 1H), 0.8-1.0 (m, 1H), 0.4-0.6 (m, 1H), 0.0-0.2 (m, 1H).